

EXPLORING HERBAL SOLUTIONS FOR DIABETES

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Abstract

Azadirachta Indica (Neem), *Psidium guajava* (Amrud) and *Allivum sativum* (garlic) are herbal plants of medicinal value for treating various ailments, specially diabetes mellitus. Aqueous extracts of these plants are prepared for investigation of the blood glucose lowering affect and improvement in body weight in Alloxan induced diabetic rats. The results obtained are compared with known antidiabetic potent drug glibenclamide. This study clearly indicates the noteworthy antidiabetic activity of these plants and supports the traditional Herbal Drugs for the treatment of diabetes mellitus.

Keywords: *Psidium Guajava*, *Allivum Sativum*, *Azadirachta Indica*, Glibenclamide, Alloxan, Diabetes mellitus.

Introduction

Diabetes mellitus is considered to be a serious endocrine syndrome world-wide but its therapeutic management still suffers from major limitations. In many countries it is traditional to use medicinal plants to control diabetes [1]. Traditional medicines have come up from folk medicines and household remedies. There is an exponential increasing acceptability of herbal drugs both in developing and developed countries. Some of the vast herbal remedies are subjected to refinements, revisions and improvements as per the latest technologies. There is continuous unending desire to unravel the centuries old secrets of herbal therapies. Traditional medicines are derived from medicinal plants minerals and organic matter [2]. The search for safe and more effective agents has continued to be an important area of active research. Since ancient time diabetes has been

treated orally with several medicinal plants or there extracts based on folklore medicines. These herbal medicines are apparently effective produce minimum or no side effects are of relative low cost as compared to oral synthetic hypoglycemic agent [3] furthermore, after the recommendation made by W.H.O. in diabetes mellitus, investigation of hypoglycemic agents from medicinal plants has become more important. This study has been undertaken to study the action of above mentioned herbal plants extracts in alloxan induced diabetic rats.

Materials and Methods: - The experiment was performed to evaluate the comparative, efficacy of *Psidium Guajava*, *Allivum Sativum*, *Azadirachta Indica* and Glibenclamide on Alloxan induced diabetic rats.

Collaction and Acclimatization of rats: - Thirty mixed albino rats aged between 3 to 4 months and

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weighing between 200 to 300 gm were collected taken at Institute of Professional Studies Pharmacy College, Gwalior (M.P.). Rats were grouped in six groups of each 5. Each group of rats was housed in serene bottomed wire cages arranged in rows and fed on standard pellet diet (Hindustan lever, Mumbai India) and Water ad libitum. The Rats were maintained in this condition for a period of 3 weeks to acclimatize them for experiment.

Experimental Induction of diabetes in rats:- The rats were injected intraperitoneally with alloxan monohydrate dissolved in sterile normal saline at a dose of 150 mg/kg body wt. [4]. After 2 weeks, rats with moderate diabetes having glycosuria (Indicated by Benedict's qualitative test) and hyperglycemia (i.e. with blood glucose of 200-300 mg/dl.) were used for the experiment. The control rats received the same amount of sterile normal saline.

Plant Extract: Leaf extract of *Psidium Guajava*, *Allivum Sativum* and *Azadirachta Indica* leaves were obtained from Tulsi Amrit Pvt Ltd., Indore (MP) India.

Daonil (Glibenclamide) manufactured by Aventis Pharma Ltd. Goa India, was collected from market.

Experimental Design: In this study total 30 rats divided into six groups having five rats in each group were used as follow-

Group I: Consisted of 5 rats which served as normal control and were given distilled water only.

Group II: Consisted of 5 Alloxan induced diabetic rats and served as diabetic control and were having free access to distilled Water only.

Group III: Consisted of 5 Alloxan induced diabetic rats and were treated with Aqueous extract of *Psidium guajava* leaves at the dose of 500mg/kg body weight daily for 15 days once a day.

Group IV: Consisted of 5 Alloxan induced diabetic rats and were treated with aqueous extract of *Allivum Sativum* at the dose of 1g/kg body wt. daily for 15 days once a day.

Group V: Consisted of 5 Alloxan induced diabetic rats and were treated with Aqueous extract of *Azadirachta Indica* leaves at dose of 500 mg/kg body weight for 15 days once a day.

Group VI: Consisted of 5 Alloxan induced diabetic rats and were given Glibenclamide at the dose of 600 μ g/kg body wt. daily for 15 days once a day.

Observations were made after 15 days of Herbal Administration. Single pan balance was used to check the body weight of rats before and after the experiment. Blood glucose level was estimated at the beginning day 0 and on 15 day of experiment by glucometer using strip method and taking the blood from tip of the tail.

Animal housing, care and application of experimental procedures were in accordance with institutional animal ethic guidelines.

Result and Discussion:-

Effect on body weight in control and Experimental rats- Diabetes result in weight loss and the same has been observed in this study. The reduction in weight loss in diabetic group when compared with normal control group.

This effects of administration of aqueous leaves extracts of *Psidium Guajava*, *Azadirachta Indica* and *Allivum Sativum* on the body weight in "Normal, Control, diabetic and diabetic treated rats are recorded in table 1. after 15 days administration of plant extract and Glibenclamide, body wt. increased significantly ($p < 0.01$) to the extent of 4.76 to 11.84 percent as compared to pretreatment period, in diabetic control group body weight decreased (4.72%). As far as the relative efficacy in increasing or maintaining body weight is concerned higher body weight (7.49%) was recorded in *Azadirachta Indica* treated group followed by *Psidium*

Guajava (4.33%) and *Allivum Sativum* (1.40%), Glibenclamide also increased the body weight (6.82%), Observation of the study support the

results of some researchers [5, 6, 7] who reported significant increase in body weight after treatment with herbal preparation in hypoglycemic animals.

Table 1:- Effect of *Psidium Guajava*, *Azadirchta Indica* and *Allivum Sativum*, leaves extract and Daonil (Glibenclamide) Tablet on body weight gain in normal and Alloxan treated diabetic rats.

Groups of Rat	Treatment mg/kg bd wt. oral	Body Weight (gm)		
		Pretreatment 0 day	Post treatment day 15 (Mean + SD)	
			Mean + SD	Percentage Deviation
1	Normal Control	258.52 ± 4.98	260.12 ± 4.92	+0.62
2	Diabetic Control	225.10 ± 10.64	214.02 ± 10.78	-4.922
3	<i>Psidium Guajava</i> leaves extract	168.78 ± 6.72	176.06 ± 6.16	+4.33
4	<i>Allivum Sativum</i> leaves extract	151.64 ± 8.78	153.76 ± 8.84	+1.4
5	<i>Azadirchta Indica</i> leaves extract	148.36 ± 8.84	159.4 ± 8.76	+7.49
6	Daonil 0.6 mg Glibenclamide	178.62 ± 5.56	199.76 ± 5.68	+11.84

Effect on blood glucose level in normal and Experimental Rat: Alloxan causes specific destruction of cells of islet of Pancreas and result an increase in blood glucose levels. It is evident that Alloxan administration of 150mg/kg body wt. Causes diabetogenic-

response in albino rats, the effect of administration of aqueous leaves extracts of *Psidium Guajava*, *Azadirchta Indica* and *Allivum Sativum* on blood glucose in normal control diabetic control and diabetic treated rats is shown in Table 2.

Table 2:- Effect of *Psidium Guajava*, *Azadirchta Indica*, *Allivum Sativum* Extracts and Dionil (Glibenclamide) Tablet on blood glucose in normal and Alloxan treated diabetic rat.

Groups of Rat	Treatment mg/kg bd wt. oral	Body Glucose mg/dl		
		Pretreatment 0 day	Post treatment day 15 (Mean + SD)	% Variation
2	Diabetic Control	272.42	280.22	+2.78
3	<i>Psidium Guajava</i> leaves extract	250.94	219.22	-12.64
4	<i>Allivum Sativum</i> leaves extract	260.22	193.75	-25.54
5	<i>Azadirchta Indica</i> leaves extract	261.92	236.90	-9.55
6	Daonil 0.6 mg Glibenclamide	262.56	150.86	-42.64

After 15 days of treatment with *Psidium Guajava*, *Azadirchta Indica*, *Allivum Sativum* Extracts and Dionil (Glibenclamide) blood glucose decreased significantly from 9.55 to 36 percent as compared to pretreatment status. The plant materials were

in the study, *Azadirchta Indica* was more effective which decreased the blood glucose (25.54%) as compared with two other plant extracts used in this study i.e. *Psidium Guajava* (12.64%) and *Allivum Sativum* (9.54%) Daonil also decreased the blood glucose by (42.64%).

The exact mechanism in reducing blood glucose level is not well understood. The probable cause of reduction of blood glucose might be due to increased uptake of glucose peripherally and increased sensitivity of insulin receptor in case of *Azadirchta Indica* leaves extract. Blood glucose reduction following administration of insulin and *Azadirchta Indica* is also reported [7, 8]. Antidiabetic effect of Garlic is thought to be due to the formation of a colloidal type suspension in the stomach and intestines when the mucilaginous fiber of garlic is hydrated affecting gastro intestinal transit and slowing glucose absorption.

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